CENTER FOR COMPREHENSIVE EUROPEAN AND INTERNATIONAL STUDIES

Tech Sovereignty – Prospects for Cooperation between Russia and India

Visionary Review

TECHNOLOGICAL SOVEREIGNTY EXPORTS ASSOCIATION

RUS®SOFT

papswap CENTRE FOR PUBLIC POLICY

June 2024

Content

1. Introduction.

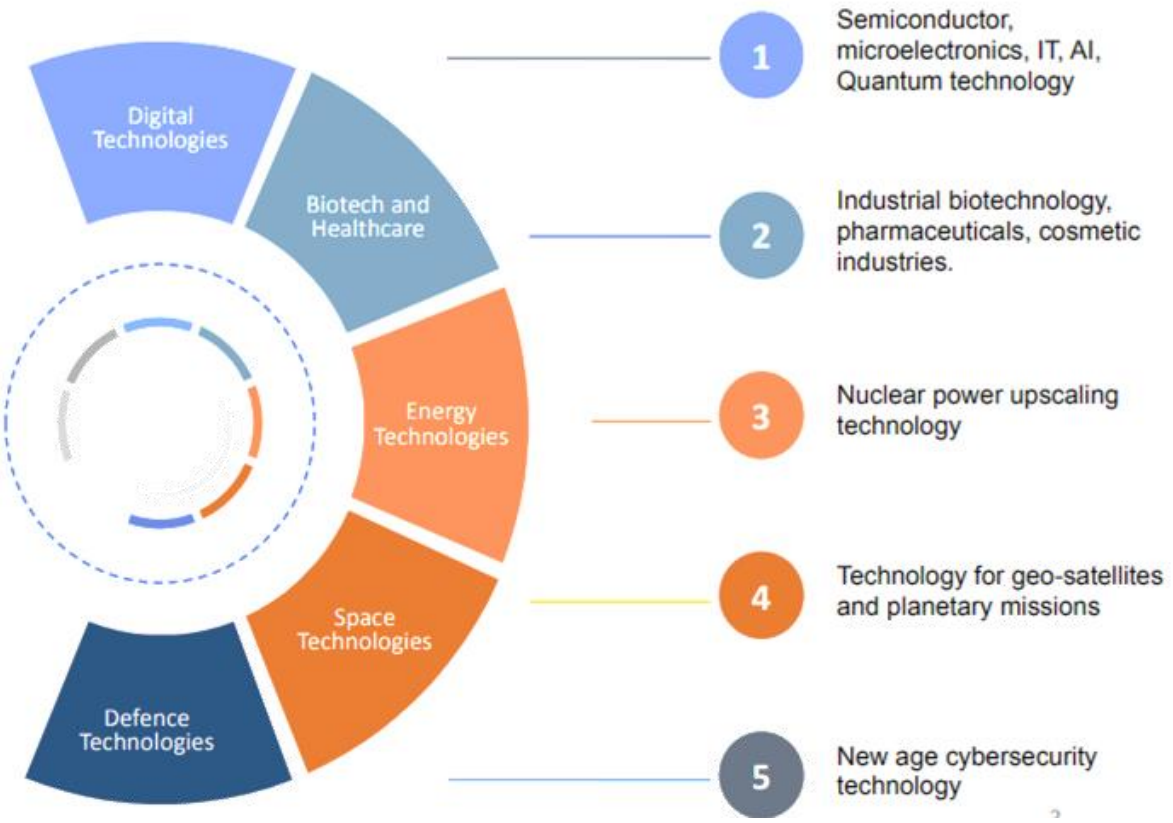
Historically, Russia and India have profound links and found common points of cooperation.

Russian diplomacy played a significant role in helping India resolve disputes during the Indo-Pakistani wars in 1965, leading to an end to conflict in Kashmir. These disputes quickly escalated into border conflicts between the two countries, with fighting that did not determine a clear winner. However, the conflict was brought to a halt through the intervention of the UN, resulting in a ceasefire and a negotiated settlement. In recent years, India's leadership in the Non-Aligned Movement has consistently sought to balance Western influence around the world.

Following the dissolution of the Soviet Union, major imports from Russia have consisted of weaponry and energy supplies. Current Indo-Russian trade relations also primarily focus on oil and natural gas, as well as defence technology and the import of arms. For instance, in the early 2020s, top Russian exports to India were coal briquettes, valued at $923 million. Indian exports to Russia were primarily medications, valued at approximately $444 million. In 2020, bilateral trade between India and Russia was approximately $6 billion, while bilateral trade between the United States and India was $120 billion. While **by 2023 Russian-Indian turnover jumped to 54,7 bln dollars**.

In order to upgrade scientific and technological cooperation between Russia and India as a driver to mutually beneficial socio-economic development, we have prepared the present report. This report is dedicated to the prospects for further cooperation between states in the area of technological sovereignty. During 3-month long collaborative research, Russian and Indian research teams have conducted a study of Russian and Indian legal sources, based on which they matched strategic for both countries. Afterwards, research teams identified pivotal challenges in these areas and named **5 key areas for symbiotic cooperation** in new-generation economic collaborations.

2. Common priority areas derived from legal sources



Top-5 priorities of joint Russian-Indian cooperation in tech sovereignty

2.1. *Space Exploration and Aerospace Technology*

Indian Space Research Organization (ISRO) Act (2002) and Russia's Federal Law on Space Activities (1993)*:* Both documents regulate and promote space exploration, satellite technology, and related activities, aiming to foster scientific research, technological development, and international collaboration. The overlapping interests include joint missions, data sharing for scientific research and Earth observation, and the development of space infrastructure. Collaboration in space exploration could involve joint missions to explore Mars, sharing satellite data for weather forecasting and disaster management, and partnerships in building and operating space stations such as the International Space Station (ISS).

2.2. *Information Technology and Software Development*

India's National Policy on Software Products (2019) and Russia's Federal Law on Information Technologies (2006)*:* These documents focus on regulating and promoting the IT sector, including software development and cybersecurity. Both emphasize the importance of technology transfer, joint research projects, and partnerships to foster innovation, competitiveness, and digital transformation in the global IT industry. Collaboration in IT could involve joint research projects in emerging technologies like artificial intelligence and blockchain, technology transfer agreements to enhance cybersecurity capabilities, and partnerships between Indian and Russian IT companies to develop software solutions for sectors such as healthcare and finance.

2.3. *Nuclear Energy*

Atomic Energy Act (1962) in India and Russia's Federal Law on the Use of Atomic Energy (1996): These laws provide legal frameworks for the peaceful use of nuclear energy, reactor design, and safety standards. Both countries aim to promote nuclear energy as a clean and sustainable source of power, with overlapping interests in technology transfer, research collaboration, and nuclear safety measures. Collaboration in nuclear energy could involve joint research on advanced reactor designs such as fast breeder reactors, technology transfer agreements for the construction of nuclear power plants, and partnerships in nuclear waste management and decommissioning.

2.4. *Biotechnology and Pharmaceuticals*

India's National Biotechnology Development Strategy (2007) and Russia's Federal Law on the Circulation of Medicines (2010): These policies focus on promoting research, innovation, and regulation in the biotechnology and pharmaceutical sectors. Both countries recognize the potential for collaboration in areas such as joint research projects, clinical trials, and production partnerships to address global health challenges and develop new medical treatments. Collaboration in biotechnology and pharmaceuticals could involve joint research on vaccines and treatments for infectious

diseases, clinical trials for new drugs, and partnerships in vaccine production and distribution to combat pandemics such as COVID-19.

2.5. *Renewable Energy and Green Technologies*

National Solar Mission (2010) in India and Russia's Federal Law on Energy Saving and Energy Efficiency (2009)*:* These initiatives aim to promote renewable energy sources and technologies to address energy security and climate change concerns. Both prioritize technology transfer, joint ventures, and research collaborations to accelerate the development and deployment of renewable energy solutions, indicating overlapping interests in sustainable development and environmental protection. Collaboration in renewable energy could involve joint projects to develop solar and wind power plants, technology transfer agreements for the production of renewable energy equipment, and partnerships in research and development of green technologies such as hydrogen fuel cells and carbon capture and storage (CCS).

Russian challenges in common priority areas

2.6. ***Russian challenges in Space Exploration and Aerospace Technology:***

- ***Lack of a unified technical, organizational and financial policy aimed at the implementation of specific projects;***
- ***Deficit of budget financing and high cost of credit resources.***

Although there is a federal law on public-private partnerships, there is ***no mechanism for attracting private investment in the industry for business development and the implementation of commercial ideas and space projects***. Budgetary financing entails government regulation and, as a result, excessive control over the flow of funds, increased costs for attracting specialized institutions, issuing opinions, and conducting certification.

- ***The system of corporate governance and labor motivation of employees of the State Corporation "Roscosmos" needs improvement.***
- ***The State Corporation "Roscosmos" has poorly developed information availability for shareholders and the corporate direction related to shares and investments in this company is not developed.***
- ***The State Corporation "Roscosmos" operates an outdated corporate governance model.***
- ***Russian software cannot completely replace the wide range of programs created in other countries.***[1]

2.7. ***Russian challenges in Information Technology and Software Development***

- ***The insufficiency of a complete replacement of all existing software created by other countries, as well as the insufficient level of functionality and quality of existing domestic software products:***

Russian software cannot completely replace the wide range of programs created in other countries.

[1] СОВРЕМЕННЫЕ ПРОБЛЕМЫ КОРПОРАТИВНОГО УПРАВЛЕНИЯ ГК «РОСКОСМОС» (cyberleninka.ru)

Despite the availability of alternative software products that can replace Microsoft Office, Adobe or Autodesk, Russian developments still do not always meet international standards in this area (When developing software, due attention must be paid to testing and quality control to ensure stable operation and compliance with functionality and user requirements. In addition, it is important to continue to develop and improve existing software products so that they meet modern user requirements and international standards.).

Despite significant investments in the development of domestic software, both in the form of funding and in the form of grants, the level of knowledge and time is limited to achieve the level of quality of global manufacturers. Studying the history of programming over the last thirty years in a short period of time is virtually impossible.

- ***The problem of activating software imported into Russia through parallel or gray imports.*** Improper import practices and lack of control over this process can lead to the creation of serious vulnerabilities in IT systems and also threaten information security.

Emerging problems with market position in Russia present software resellers with serious challenges. Currently, local software companies prefer to sell their products directly. This creates additional competition for resellers, which also arises from the manufacturers themselves. As a result, resellers face the loss of large deals with large companies, which leads to problems in the relationship between manufacturers and partners.

- ***Pricing in software industry in Russia.*** The functionality of Russian products differs significantly from foreign ones, which is reflected in prices. In this regard, Russian companies cannot offer their products at the same prices as foreign manufacturers, which is why the average sales bill is reduced, and license sales are reduced too. Company turnover has fallen several times, indicating that companies are working just as hard or even

harder, but are earning significantly less income. This problem also significantly affects the retail software market in Russia.[2]

2.8. ***Russian challenges in Nuclear Energy:***

- ***Disposal of radioactive waste***. Radioactive waste is hazardous to the environment and can pose a threat to human health. To solve this problem, it is necessary to develop new technologies for the processing and disposal of radioactive waste, as well as conduct research on the development of new materials that can be used for storing and processing radioactive waste;
- ***Not using the full potential of nuclear fuel***;
- ***Large amounts of radioactive waste, storage and disposal of spent nuclear fuel, weapons-grade plutonium;***
- ***A labor-intensive and costly process for the extraction and enrichment of uranium.***[3]

2.9. ***Russian challenges in Biotechnology and Pharmaceuticals:***

- ***Excessively high prices for drugs in Russia;***
- ***Presence of counterfeit products;***[4]
- ***Narrow product specialization, low competitiveness of products on the world market;***
- ***Significant backlog in the production of industrial biological products;***
- ***Material base:***

Most instruments and equipment are imported.

High import dependence, which has a bad effect on the development of the industry due to sanctions and the departure of a number of companies from Russia.

The market as a whole is growing, but the financial results of individual companies are unstable.

[2] https://scienceforum.ru/2021/article/2018025500
[3] file:///C:/Users/user/Downloads/osnovnye-vyzovy-i-problemy-atomony-energetiki.pdf
[4] https://ekonomika.snauka.ru/2016/01/10667

- ***Control system:***

Many organizations and problems of interaction between them - “there is no body making decisions about what tasks to solve”. The industry is dispersed and governed by the Ministry of Agriculture, the Ministry of Industry and Trade, the Ministry of Education etc. Instability of priorities makes management more difficult, as well as unsystematic decisions — “sequencing equipment was purchased, but software and consumables were not”.

To add lack of analysis and evaluation of the results of decisions made. And excessive bureaucracy and regulation — “during COVID-19, everything was done very quickly, but now everything has returned”.[5]

2.10. ***Russian challenges in Renewable Energy and Green Technologies***

- **Low competitiveness compared to stations running on fossil fuels.** This feature is associated with the large investments required for the construction of renewable energy facilities, the limited possibilities of their use and the low cost of fossil raw materials in the country;
- **Reluctance of business to invest in the development of alternative energy facilities.** In addition, the role of the Government of the Russian Federation and its relevant ministries and departments in stimulating private business in this area cannot be considered significant;
- **Curtailment of investment from developed countries in connection with the Ukrainian crisis.**[6]

[5] https://uiec.ru/wp-content/uploads/2023/06/%D0%9A%D1%80%D0%B0%D0%B2%D1%87%D0%B5%D0%BD%D0%BA%D0%BE-%D0%B8-%D1%81%D0%BE%D0%B0%D0%B2%D1%82%D0%BE%D1%80%D1%8B-25.05.2023.pptx

[6] https://science.kuzstu.ru/wp-content/Events/Forum/Ecology/2023/MEF_2023/pages/Articles/0109.pdf

2.11. **Indian challenges in common priority areas**

2.11.1. **Space Sector Investment Challenges**

Legal Considerations for Investment Categorization:

- Determining the correct sub-sector for foreign investment in space-related industries presents legal complexities, such as different FDI caps: 74% under automatic route for some segments, and 100% for manufacturing components related to these segments.

Market and Exit Strategy Development:

- The space sector, having received venture capital and private equity investments, has yet to develop a sector-specific market framework and establish proven exit strategies.

2.11.2. **Data Management and Accessibility**

Data Integration Challenges:

- Data fragmentation across different organizations hampers the smooth integration necessary for large-scale solutions.

Initiatives to Improve Data Accessibility:

- Projects like the Open Government Data Platform aim to improve data accessibility. The Ministry of Electronics and Information Technology's initiative seeks to facilitate access to anonymized data for AI innovation, but they are in the nascent stage.

Computing Power and Dependency:

- India's dependence on foreign computing resources is highlighted by a global shortage, with most major players located in the US. The government's investment in domestic capabilities includes plans for AI innovation hubs and supercomputing resources like those at C-DAC Pune.

2.11.3. ***Nuclear Sector Outlook***

Global Nuclear Market Integration:

- India’s bid for NSG membership is crucial for its full integration into the global nuclear market.

Advancements in Nuclear Technology:

- Russia's development of the VVER-1200 reactors promises more efficient power generation, yet the entre thing will only be useful when India's use of thorium and development of SMRs and ASMRs are ready to be accessed for the advance nuclear technology.

2.11.4. ***Pharmaceutical Sector Regulatory Impact:***

Price Regulation Impacts:

- Government price controls, while making essential drugs more affordable, negatively impact the profitability and reinvestment capabilities of pharmaceutical companies.

Counterfeit Drugs Issue:

- Counterfeit drugs constitute about 25% of the domestic market in India, with India producing 35% of the world's spurious drugs, according to WHO;
- Education and Industry Gap;
- Annually, approximately 400,000 Pharma graduates are produced in India, yet there is a significant gap between educational offerings and industry needs, leading to inefficiencies.

Dependency on Foreign Raw Materials:

- About 80% of the Indian Pharma Market's API needs are fulfilled by China, with occasional price surges due to policy changes and geopolitical reasons.

2.11.5. ***Renewable Energy and Infrastructure:***

Electric Vehicle (EV) Adoption Challenges:

- Despite incentives, EV adoption is hindered by high costs, lack of infrastructure, and dependence on imported batteries, primarily from China;

Regulatory and Approval Obstacles for Infrastructure Projects:

- Infrastructure projects face numerous regulatory hurdles, including environmental, safety, and state-specific permits, which discourage foreign investment.

Importance of ESG Factors:

- ESG compliance is complex and costly, particularly affecting infrastructure sectors, which bear the financial burden without potential reimbursement.

Technological Adaptation and Cybersecurity Concerns:

- The adoption of advanced technologies like AI and IoT poses regulatory and cybersecurity challenges, necessitating substantial investment and regulatory support for effective integration.

3. What Russia could possibly suggest India to better meet its challenges in common priority areas

Russia and India have top-five common priority areas such as **space, information technology, nuclear energy, biotechnology, renewable energy**. To address the challenges in these areas, Russia could suggest the following solutions:

In the space sector, Russia could suggest India to collaborate on joint space missions and projects, such as satellite launches and exploration missions. In addition, Russia could suggest India streamline and harmonize the FDI caps for different sub-sectors of the space industry to avoid confusion and encourage more foreign investments. Russia could recommend India to develop a clear market framework and establish robust exit strategies specific to the space sector to attract more venture capital and private equity investments.

In terms of data management and accessibility, Russia could suggest India to invest in data infrastructure and technology to ensure that data is stored securely and can be easily accessed and utilized. This could involve collaborating on data management systems and sharing best practices in data governance. Russia could encourage India to expedite the implementation of initiatives like the Open Government Data Platform and support the Ministry of Electronics and Information Technology's efforts to enhance data accessibility for AI innovation.

In the nuclear sector, Russia could suggest India to enhance its cooperation in the development and maintenance of nuclear power plants and research reactors. Russia could advocate for increased collaboration in nuclear technology development to facilitate India's full integration into the global nuclear market.

In the pharmaceutical sector, Russia could suggest India to consider a balanced approach to price regulation to ensure affordable access to essential drugs. Also, Russia could recommend India to strengthen regulatory oversight and enforcement measures to combat the production and distribution of counterfeit drugs, aligning with international standards.

In the renewable energy and infrastructure, Russia could suggest streamlining regulatory processes, providing clear guidelines, and offering incentives to attract foreign investment in infrastructure projects.

In the infrastructure sector, especially in areas like artificial intelligence (AI), cybersecurity, and electric vehicles, Russia could suggest India to enhance its technological capabilities by investing in research and development in these areas. Collaboration on joint projects for the development of AI solutions, cybersecurity systems, and electric vehicle infrastructure could help India address its infrastructure challenges and boost economic growth.

Russia could also suggest India to establish partnerships with Russian companies and research institutions that have expertise in AI, cybersecurity, and electric vehicles. This could facilitate knowledge exchange, technology transfer, and joint research and development efforts to address common challenges in these priority areas.

4. What India could possibly suggest Russia to better meet its challenges in common priority areas

5.1. *General challenges*

The countries should increase their trust and accountability of joint projects and the business environment. India and Russia should attract expert community, think tanks and ensure systemic contacts between them at special meetings dedicated to specific areas of cooperation. In addition, academic exchanges between the two countries should be improved. India can increase the number of Indian specialists sent to Russia for training. This will allow India not only to train staff in relevant fields but also form a more influential and larger community of Indian employees within Russia, who will attract investments from India and vice versa. Moreover, India should change its image in Russia; increase the awareness of Indian projects in scientific and technological fields among Russian businesses, academic and expert community.

Also, the zero-sum game, which is connected to the desire of countries to develop domestic production of various goods, technological achievements by local producers, represents an extremely serious barrier to bilateral relations. This leads to distrust and hampers large investment projects. Overcoming such an approach to cooperation is seen as possible when the countries strike a balance between local manufacturing and the openness of the market.

Another option may serve the establishment of joint ventures, centers of competence, which promote exchange of expertise, technology transfer and joint innovations. A good case in point is that since 2016, the Russian Science Foundation, together with Indian partners from the Department of Science and Technology, has been conducting a competitive selection to support international Russian-Indian research teams.[7] Therefore, this grant cooperation solves the problem of financing and realizing promising initiatives in science and technology.

[7] https://india.mid.ru/en/news/russia_and_india_strengthen_cooperation_in_science_and_technology/

5.2. ***Biotechnologies and medicine***

India and Russia have the possibility of developing joint projects in this field. For example, Applied Research Department of Science & Technology (DST) & Department of Biotechnology (DBT) on Indian side and Russian Ministry of Science & Higher Education, have supported over 15 joint R&D projects in the areas such as Environmental Sciences, Energy (including renewable), Nano-science & Technology, Information & Communication Technologies and Biotechnology.[8]

Moreover, the Indian side shows the readiness to open the market and accept the high-quality foreign bio-innovations, like Russian vaccines Sputnik V and Sputnik Lite, which have received regulatory approval in India, and whose mass production has been organized at Indian enterprises *Serum Institute of India, Morepen Laboratories, Gland Pharma, Hetero Biopharma, Virchow Biotech, Panacea Biotec, Strides Pharma Science, Stelis Biopharma*. 100% FDI is allowed under the automatic route for the manufacturing of medical devices and pharmaceuticals. In turn, Indian companies are entering the Russian pharmaceutical market by trying to produce diapers, personal hygiene products, and other medical supplies in the Sakhalin region, which will address the problems of medical goods delivery and the dependence on imported assistive technologies.

Furthermore, the Indian company *PSK Biotech Private Prabind Singh* plans to use IT technologies in medicine there. Russia also provides special experimental legal regimes in telemedicine. In general, the overseas demand for Indian vaccines and biopharmaceuticals is increasing due to the globally competitive efficacy of Indian products.[9] India offers a strong capability in contract manufacturing, research and clinical trials in the field of Bio IT and Services. India suggests collaborating with 75 bio-incubators and employment for more than 32, 000 candidates. There are 11 projects in 16 districts of 168.3 billion dollars in the field of biotechnologies. India suggests the

[8] https://indianembassy-moscow.gov.in/indo-russian-s-t-cooperation.php

[9] https://www.investindia.gov.in/sector/biotechnology

opportunities of Medical Devices Parks, Life Sciences Parks, Medical Devices Clusters where investors can collaborate with state promoters and sponsors.[10]

Russia does not have strong market positions in these biotechnologies in comparison with Indian biotechnologies market, which increases the attractiveness of combining bilateral potential in biotechnologies.

5.3. *Nuclear energy*

India views the growth of its nuclear power program as essential for achieving energy security and sustainable development goals. India is interested in the development of nuclear infrastructure with Russia. A case in point is that India's only nuclear power plant established with another country is the *Kudankulam Nuclear Plant* in Tamil Nadu in 2013 (the support of Russia).

In 2003, approval was granted for *Bhartiya Nabhikiya Vidyut Nigam Ltd.* (BHAVINI) to design, construct, and operate the Prototype (PFBR), which became India's most advanced nuclear reactor. India is interested in the development and exploitation of Fast Breeder Reactor where Russia can help. India constructs its own Prototype of such a reactor in 2003. Moreover, India constructs some nuclear power plants in Tamil Nadu, Rajasthan and Gujarat where it can address for Russian help in expertise and technology transfer.

While under India's foreign direct investment (FDI) policy, foreign investment in the atomic energy sector is prohibited, it is essential to note that 100 percent FDI is allowed in the sector that produces nuclear parts and equipment for nuclear power plants and other related facilities.[11] Also, private companies are also permitted to undertake construction contracts for activities beyond reactor operations.

[10] https://www.investindia.gov.in/sector/biotechnology

[11] https://www.india-briefing.com/news/india-nuclear-energy-powering-green-energy-net-zero-emissions-targets-32131.html/#:~:text=India%20has%20established%20its%20goal,India's%20overall%20energy%20transformation%20strategy.

Furthermore, in 2023, a *NITI Aayog* panel recommended that the central government had allowed FDI into India's atomic sector. This panel has recommended changes to India's foreign investment policies so that both domestic and foreign private companies can complement nuclear power generation by public companies. India plans to increase nuclear power capacity from 7480 MWe to 22,480 MWe by 2031-32 with the development of 10 reactors totaling 8000 MWe across several states. The countries welcome the action for localization between Rosatom of Russia and the Department of Atomic Energy of India. For example, ASE JSC (part of Rosatom State Corporation Engineering Division) had shipped the reactor (nuclear equipment) to the construction site of the Unit III of Kudankulam nuclear station, in accordance with its obligations, when the developer — the technical customer of the facility — is Nuclear Power Corporation of India.[12] In addition, Russia is negotiating several new nuclear power plant projects in India, both countries are cooperating on the Ruppur NPP project in Bangladesh and are discussing further joint nuclear power plant projects in Asia and Africa with a larger share of Indian manufacturers.

Indian experts point out that incentives such as tax benefits, subsidies, bilateral agreements on investment protection, harmonization of technical standards, can boost the trust of investors to India and stimulate joint nuclear projects.

5.4. *Defense cooperation*

India's diversification strategy may be a barrier to bilateral cooperation in this field.[13]

In military cooperation, India can intensify the domestic military-industrial complex, which Moscow supports, rather than excessively strengthen the purchase of weapons from Western countries, becoming more technologically dependent.[14] The

[12] https://rosatom-southasia.com/press-centre/news/reactor-vessel-installed-at-kudankulam-npp-unit-3/

[13] https://www.usip.org/publications/2024/02/limitations-india-and-russias-transactional-relationship

[14] https://russiancouncil.ru/en/activity/publications/russia-india-relations-in-broader-geopolitical-context/ P. 20.

Indo-Russian Rifles Private Limited — a factory established in 2019 to co-produce more than 600,000 assault rifles for the Indian armed forces.[15] So enhancement of Russian military hardware served and continues to serve as a significant factor of satisfying Indian military needs in equipment and expertise, the latter especially promising due to the increase of Russian military experience.

5.5. *Digital technologies (AI ones), quantum technologies*

The main problems with developing digital technologies include supply chain disruptions, especially due to sanctions or their threat (secondary sanctions), the gap between insufficient legal base (laws) on digital technologies and pace of technological development and the absence of a unified approach. Moreover, experts highlight the low awareness of opportunities to apply technologies, the absence of sufficient number of specialists and a close regime of industry-related data.

India could increase compatibility in legal documents on digital issues (data protection) with Russia, which will promote trust and accountability in the business environment.

India can offer to introduce AI technologies in agriculture, healthcare, smart cities, which corresponds to the National Artificial Intelligence Strategy of 2018 and the Russian National Strategy for the Development of Artificial Intelligence for the period until 2030. Furthermore, India and Russia should create special centers for practical implementation of AI technologies in different economic sectors. Also, India could collaborate with Russia on data protection issues.[16] NITI Aayog drafted the Principles for Responsible AI in 2021, which reflects the importance of considering the ethical challenges raised by AI implementation for India and which is important for Russia. This highlights the same principles shared by both parties: non-discriminatory access to data, anonymization of personal and medical data (privacy), security, social and humanitarian aspects of AI implementation, the influence of AI on employment of

[15] https://www.politico.eu/article/india-defense-imports-russia-exports-trade-weapons/

[16] https://www.india-briefing.com/news/india-regulation-of-ai-and-large-language-models-31680.html/

people in the labor market. It is possible to harmonize national standards of Russia and India and mutual conformity assessment in the field of AI and robotics (the Bureau of Indian Standards should be attracted to this activity when it proposes draft Indian standards for this field). Also, there should be unification in models of competences in the field of AI and digital technologies in general in order to ensure mutually acceptable standards of staff training. Russia and India develop their educational programmes, introduce new online-courses on AI-related issues and collaborate in this field (the Centre for Development of Advanced Computing (C-DAC) and the Institute for Computer Aided Design (ICAD) of the Russian Academy of Science).[17] In addition, in 2020 and 2021, with the help of Russian Academy of Science (RAS), Russia India Network of Universities (RIN) and DST/CSIR/IIT/IISER institutes have conducted a series of scientific webinars in Data Analytics, AI, Nano-technology, New Materials, Advanced Manufacturing, Quantum Technologies, Interdisciplinary Cyber Physical Systems. These meetings should be constant and reflect the continuity of their joint activity.

India, for example, sees significant prospects in joint research and development in the field of quantum computing. The Indian Institute of Fundamental Research Tata (Tata Institute of Fundamental Research, TIFR) has already signed a memorandum of understanding with Skoltech, which is aimed at advancing research and development in the field of quantum technology. The partnership aims to share knowledge, develop joint research projects and develop tools for quantum computing. Although the Indian partner left the Russian site after the pandemic, there is an opportunity to continue such cooperation in the near future.

India is setting up the National Quantum Mission in 2023 and aims at creating four Thematic Hubs in the domains of quantum computing, quantum communication, quantum sensing & methodology, quantum materials and devices,[18] which opens ample opportunities for bilateral cooperation in these fields.

[17] https://indianembassy-moscow.gov.in/indo-russian-s-t-cooperation.php

[18] https://dst.gov.in/national-quantum-mission-nqm

5.6. *Microelectronics and electronic industry*

India can increase export in these areas, whose niches remained after the withdrawal of Western manufacturers from the Russian market, as well as participate in the enhancement of parallel export of Western products to Russia.

The most promising thing is that these countries spend a lot of money on the establishment of factories producing microelectronic products, the development of own software and fundamental algorithmic models.

In addition, when both countries are interested in staff training in microelectronics, a lot of good specialists leave these countries in order to find a better job and have a decent salary. It is necessary to create more promising ventures with higher working conditions, decent salary and use grant means.

The Modified Semicon India Programme (MSIP) of 2023 for setting up semiconductor fabs and display fabs in India. The strategy comes after the government's consultation with various semiconductor companies and private experts. It also comes because the initial strategy received dismal response from the global players, where only five applications were evaluated – three semiconductor fabs and two display fabs. The modified strategy is, therefore, expected to attract more global players for setting up semiconductor and display fabs in India. This Programme allows a fiscal incentive of 50 percent of the project cost will be available for the companies, consortia and joint ventures (JVs) planning to set up semiconductor fabs in India of any node (including mature nodes).[19] The demand for semiconductors will further increase as it targets to achieve US $300 billion worth of electronics manufacturing in India and US $120 billion in exports by FY 2026-27 from US $23.57 billion in FY 2022-23. The Programme also offers fiscal support of 50 percent of Capital Expenditure for establishing Compound Semiconductors and Semiconductor

[19] https://www.vifindia.org/article/2023/july/07/India-s-Semiconductor-Strategy

Assembly, Test, Marking and Packaging (ATMP)/ Outsourced Semiconductor Assembly and Test (OSAT) facilities in India.[20]

India's current chip design talent pool makes up to 20 per cent of the world's semiconductor design engineers. In line with Semicon India Programme, the Chips to Startup (C2S) programme further aims to train over 85,000 engineers qualified in related disciplines in the next five years. India focuses on new financial incentives, semiconductor design infrastructure support (to found 100 domestic semiconductor design companies). Now India imports almost all the electronic products and semiconductors, so its basic needs in achieving technological independence in semiconductors correlates with Russian ones.[21] Russia also expresses interest in the reduction of technological dependency and developing autonomous production – particularly through regional centers of collective designs (they are able to launch mass production with the support of design centers), consortiums (support in development, production, service, including participation of foreign manufacturers, but necessarily localization of production) according to The Strategy for the Development of the Electronic Industry of the Russian Federation for the period until 2030. The Indian current government provides potential semiconductor companies, even foreign ones, with huge financial incentives, logistics support in addition to creating easy of doing business environment in the country to attract leading global semiconductor companies. Russia is interested in this sphere (production of semiconductors in India due to the aim to become a global leader in chip production).

5.7. *Telecommunications sector (5G)*

Digital skills, adoption of new technologies, like IoT and 5G – smart cities. and digital literacy (according to the National Digital Communications Policy of 2018) are necessary to India and India is ready to discuss and collaborate on these issues with Russia.

[20] https://www.vifindia.org/article/2023/july/07/India-s-Semiconductor-Strategy

[21] https://www.vifindia.org/article/2023/july/07/India-s-Semiconductor-Strategy

5.8. *Infrastructure*

Transmasholding, a Russian company in the field of railway construction and Vande Bharat Express, an Indian company, worked together on railway modernization. These works include not only localization of manufacturing, but also massive staff training and post-production service, which correspond to the Made in India Programme. Also, the case in point is the joint venture like Bharat Telematic Systems Private Ltd, which targets to create GLONASS-based surveillance systems for roads and payment systems.

Countries also can use large infrastructure projects as the exploitation of national currencies in bilateral collaboration, taking into account that it is difficult to convert rupees and rubles.

5.9. *Space exploration and aerospace technology*

According to Indian Space Policy 2023, India aims at Creating a stable and predictable regulatory framework to provide a level playing field to Non-Government Entities in the Space sector, encouraging advanced research and development in space sector and promoting space innovation. Non-governmental entities are encouraged to use Indian Orbital Resources and non-Indian Orbital Resources to establish space objects for communication services over India and outside India and establish remote sensing satellite systems within and outside India. Also, India aims to develop its space infrastructure and technologies for enhancing the satellite navigation, communication and remote-sensing. IN-SPACe, Indian National Space Promotion & Authorisation Centre, issues periodically guidelines and procedures that promote ease of doing business. This center promotes industry clusters/zones/manufacturing hubs/incubation centers/accelerators/technical centers etc., for the space sector. Department of Space participates in international efforts by providing critical remote sensing satellite data for disaster management efforts and meeting the requirements

of the sustainable development goals formulated by the United Nations in coordination with the Ministry of External Affairs.[22]

The technical cooperation between Russian and Indian space agencies and industries should be facilitated with Indian Space Research Organization (ISRO) establishing a liaison unit in Moscow.

A promising area of Indian-Russian cooperation is the setting up of ground stations for their navigation satellite systems – Indian NavIC in Russia. Also, India launches Indian Remote Sensing satellites with the help of Russian 'Vostok' rockets. India sends its astronauts to the Gagarin Cosmonaut Training Centers.[23]

[22] https://www.isro.gov.in/media_isro/pdf/IndianSpacePolicy2023.pdf

[23] https://russiancouncil.ru/en/activity/publications/russia-india-relations-in-broader-geopolitical-context/ P. 36.

Conclusions

India and Russia have a great number of commonalities in scientific and technological domains. There are several common priority areas including space exploration and aerospace technology (joint missions, data sharing, and the development of space infrastructure), information technology and software development, nuclear energy, biotechnology and pharmaceuticals, renewable energy and green technologies.

In terms of digital domain, both countries are interested in ensuring cybersecurity, intensifying technology dialogue and exchange, developing cutting-edge technologies. These areas are essential due to the problems of Russian economy in ensuring efficient substitutes for imported software and digital technological solutions, when the latter ensure more reliable level of functionality and international standards, of enhancing parallel import of Western software products in Russia, of high pricing for Russian technological tools and of overcoming both countries' technological dependence. Moreover, countries are interested in terms of boosting data accessibility because Russia and India tend to localize data and make it less available. So, the countries should pursue an open policy in terms of data transfer (both countries share similar principles like non-discrimination concerning access to data) and develop joint and own data infrastructure. India and Russia could cooperate in joint research, education programs in modern technology issues and creation of quantum technologies in accordance to Indian National Quantum Mission.

Space industry has tackled significant restraints in mutually beneficial cooperation. While Russian space corporate model of governance is outdated and there is the absence of transparent information for foreign stakeholders and financial means, India imposes restriction on the amount of FDI. In terms of possible solutions, we can suggest that the countries should determine nearly the same standards in FDI in space industry. Furthermore, it is important to follow more market-oriented approaches to investments. In general, Russia and India could collaborate in terms of implementing navigation satellite systems in their territories, enhancing public space

organizations' dialogue, staff training and easing regulatory framework in order to encourage research and joint projects on remote-sensing and satellite navigation.

Nuclear energy is the sphere of increased danger, which requires a higher level of security and encourages R&D cooperation. When India tackles the problem of insufficient use of modern nuclear technologies, Russia has aware of the necessity to combat massive amounts of nuclear waste and develop full cycle of nuclear fuel processing. Russia can help India by spreading technologies, building nuclear infrastructure, promoting localization of production in India and staff training for local nuclear plants. In turn, India also develops own nuclear infrastructure and allows FDI for separate nuclear parts and equipment as well as contracts not connected to nuclear reactors.

Energy, healthcare and climate change concerns exacerbate a stable and effective economic development, which leads to accumulating bilateral efforts to promote technology transfer, construction of new facilities and plants and research. Both countries are interested in the joint vaccine production, the enhancement of renewable energy industry and sustainable development. The problems in the field of healthcare and biotechnologies are connected to high dependence on imported products and technologies, numerous counterfeit goods, high pricing, legal barriers to enter the healthcare market and insufficient link between graduates and industry representatives.

It is necessary, consequently, to ensure dialogue on legal issues in the field of healthcare (more openness like Russian experimental legal regime in telemedicine providing special legal conditions for R&D) and make prices more affordable for ordinary citizens. In order to reduce dependence, it is possible to implement joint ventures like vaccine manufacturing plants and public support for joint research through interdepartmental collaboration.

The main obstacle in the field of green transition is low cost-effectiveness of renewable energy sources in comparison with more traditional energy sources. Moreover, there are regulatory and environmental protection obstacles in terms of

launching new infrastructure projects. Consequently, India and Russia should work on increasing legal certainty and financing new infrastructure projects.

5. Authors

Russian Research Group	Indian Research Group
Irina Strelnikova **Associate Professor:** School of International Regional Studies istrelnikova@hse.ru	**Debjit Chakraborty** **Chairman**: Russia India Special Interest Group (RISING) Technology chakrabortydeb71@gmail.com
Olga Kharina **Associate Professor:** School of International Regional Studies oa.kharina@hse.ru	**Subham Sarkar** **Independent Director:** RISING subham.sarkar@gmail.com
Vadim Kropanev **Visiting Lecturer:** Department of Security Research vkropanev@hse.ru	**Kuheli Dasgupta** **Graduate student** kuheli2work@gmail.com
Maria Gurtovaya **Graduate student:** Faculty of World Economy and International Affairs megurtovaia@edu.hse.ru	

CENTER FOR
COMPREHENSIVE
EUROPEAN AND
INTERNATIONAL STUDIES

Read

in E-format: